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METALS CORROSION LAB BUREAU OF MINES
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ASSOCIATES INC
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COLUMBIA UNIV
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NYLIN G
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OAK RIDGE NATIONAL LAB
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NATIONAL LAB
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OEHME REINHARD
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OHIO STATE UNIV
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OFFICE OF NAVAL RESEARCH
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OKLAHOMA UNIV
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NEW NUCLEAR DATA

Summary of New Nuclear Data on Half Lives, Radiations, Relative Isotopic Abundances, Nuclear Moments, Neutron Cross Sections, Reaction Energies, and Masses

Prepared by National Bureau of Standards Nuclear Data Group with the Assistance of Readers

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In this issue, Nuclear Science Abstracts presents its second cumulation of new nuclear data. The material cumulated here is that which has appeared in NSA Vol. 6, Nos. 7 through 12A.

MAGNETIC MOMENT STANDARDS

In order to have a consistent basis for recording data on magnetic moments, results have been based on the following values and are without diamagnetic corrections.

$\mu(H^1) = 2.7934$ nuclear magnetons
This value has been adopted arbitrarily because it is the one used as a base in the Table of H. L. Poss, The Properties of Atomic Nuclei, I. Spins, Magnetic Moments and Electric Quadrupole Moments. (Revised, BNL-26 (T-10), (unclassified).) The values reported in the New Nuclear Data summaries are thus directly comparable with those listed in the survey of Poss.

$\nu(Na^{23})/\nu(H^1) = 0.26450$	E. Bleuler, M. Gabriel, Helv. Phys. Acta 20, 67(1947).
$\nu(D)/\nu(H^1) = 0.153506$	F. Bloch, E. C. Levinthal, M. E. Pachard, Phys. Rev. 72, 1125 (1947).
$\nu(B^{11})/\nu(H^1) = 0.320827$	D. A. Anderson, Phys. Rev. 76, 434 (1949).

LIST OF JOURNALS SURVEYED FOR NSA 6 NOS. 1 THROUGH 12

Annalen der Physik 9, Nos. 5-8; 10, 1-3.
Annales de physique 6, July-Dec. (51); 7, Jan.-April (52).
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Z. Naturforsch. 6a, Nos. 7-12.
Z. Physik 129, Nos. 1-6; 130, 1-5; 131, 1-4.

ABBREVIATIONS

a	absorption measurement	a coin	measurement by placing absorbers between counters in coincidence
$a\beta\gamma$	absorption of β's in coincidence with γ's	α	total γ-ray conversion coefficient, N_e/N_γ
ace⁻	absorption of conversion electrons		

$\alpha_K, \alpha_L, \ldots$	γ-ray conversion coefficient for electrons ejected from the K,L, ... shell
b	coefficient in angular correlation function, $1 + b \cos^2 \theta$
B	band spectra method
Beγn	measurement by detection of photoneutrons from Be
cc	cloud chamber
ce$^-$	conversion electrons
chem	chemical separation of product following reaction
Cpt	Compton electrons
d	(1) deuteron, (2) descendant of, (3) days, when used as superscript
Dγn, Dγp	measurement by detection of photoneutrons or photoprotons from deuterium
EA	electrostatic analyzer
E_0	resonance energy
$E_\beta, E_\gamma, \ldots$	energy of β ray, energy of γ ray, ...
E1,E2, ...	electric dipole, electric quadrupole ...
f	fission, in abbreviations for methods of production or detection
F-K	Fermi-Kurie β energy distribution plot
Γ	resonance half-width (the whole width at half-maximum)
I	(1) spin in units of $h/2\pi$; (2) nuclear induction magnetic resonance method
ic	ionization chamber
K/L	α_K/α_L
M	molecular or atomic beam resonance method
M1,M2, ...	magnetic dipole, magnetic quadrupole ....
mb	millibarns
Mic	microwave method
mir	measurement by total reflection of neutron beam from mirror surface
ms	mass spectrometer
μ	(1) magnetic moment in units of nuclear magnetons, (2) micron, 10^{-4} cm
μs	microseconds
osc	pile oscillator method
para	paramagnetic resonance method
pc	proportional counter
pe$^-$	photo electrons
ppl	photoplates or emulsions
q	electric quadrupole moment in units of barns
Q	reaction energy in Mev
s	(1) spectrometer method, (2) seconds, when used as superscript
S	atomic-spectra measurement
scin	scintillation counter
sl	lens spectrometer
sl;ce$^-$	conversion electrons measured in lens spectrometer
st	strong
sπ	180° spectrometer
sπ $\sqrt{2}$	double focusing spectrometer
σ	cross section in barns
σ_0	cross section at resonance energy, E_0
σ_a	absorption cross section
σ_{el}	elastic scattering cross section
σ_{in}	inelastic scattering cross section
σ_s	scattering cross section
σ_t	total cross section
t	triton, H^3
th	thermal
w, vw	weak, very weak
τ	half life in units indicated
$\beta\gamma, \gamma\gamma$	$\beta\gamma$ or $\gamma\gamma$ coincidences
$\beta\gamma(\theta)$	angular correlation of β's and γ's in coincidence
d,p(θ)	angular distribution of protons with respect to deuteron beam

Standard journal abbreviations are used.
All energies are given in Mev and all cross sections in barns unless otherwise stated in the tabular material.

NEW NUCLEAR DATA

$_0n_1^4$	Not found from Rh or Bi (18 Mev n)	K.-H. Sun et al., Phys. Rev. 85, 942 (1952).
H	σ_t(10.0 ev) (lucite) 20.09 (polystyrene) 20.49	C. T. Hibdon, ANL-4602 (March 1951).
	σ_t(14.1 Mev) 0.689	H. L. Poss et al., Phys. Rev. 85, 703A(1952).
$_1H_2^2$	Spectral shape analyzed neutrino mass <5 kev	O. Kofoed-Hansen, Phil. Mag. 42, 1448 (1951).
He	σ_a(th n) 0.78	C. T. Hibdon, C. O. Muehlhause, ANL-4680 (Sept. 1951).
$_3Li_3^6$	Level 2.12 Li^6(p,p) sπ	W. M. Harris, Phys. Rev. 84, 1249(1951).
$_3Li_4^7$	μ 3.2569 I	T. Kanda et al., Phys. Rev. 85, 938(1952).
$_3Li_4^7$	Level 4.59 Be^9(d,α)	A. Ashmore, J. F. Raffle, Proc. Phys. Soc. (London) A65, 296(1952).
	Li^6(d,pγ)Li^7 $p\gamma(\theta)$ = constant E_d = 0.5	W. H. Burke, J. R. Risser, Phys. Rev. 85, 741A(1952).
	Li^6(d,pγ)Li^7 $p\gamma(\theta)$ = constant E_d = 1.0	G. C. Phillips et al., Phys. Rev. 85, 742A(1952).
	$\sigma[B^{10}(n,\alpha)Li^7]$ / $\sigma[B^{10}(n,\alpha)0.477$ level $Li^7]$ graph for $E_n = 0 - 4$	H. Bichsel et al., Helv. Phys. Acta 25, 119(1952).
Be	σ_t(1.9 – 3.8 Mev) graph Broad maximum at 2.75	R. Ricamo, W. Zünti, Helv. Phys. Acta 24, 419(1951).

$_4Be^7_3$	$Li^6(p,p$ and $p,\alpha)$ Levels Γ J ~6.4 large $\leq 3/2+$ 7.16 0.43 $1/2-$		S. Bashkin, H. T. Richards, Phys. Rev. 84, 1124(1951).
	Level $B^{10}(p,\alpha\gamma)$ 0.432 scin No other γ with $E_\gamma<1.0$		R. B. Day, T. Huus, Phys. Rev. 85, 761A (1952).
	No $\gamma\gamma$ scin		F. R. Metzger, Phys. Rev. 85, 727A(1952).
$_4Be^8_4$	Levels $Li^6(d,n)Be^7$ 22.58, 23.68 pc		L. M. Baggett, S. J. Bame, Jr., Phys. Rev. 85, 741A(1952).
	$Li^7(p,\gamma)$ Resonant γ's isotropic, non-resonant anisotropic		H. Nabholz et al., Helv. Phys. Acta 25, 153(1952).
	$Li^7(p,p)$ Resonances: 1.05, 1.88, 2.06		S. Bashkin, H. T. Richards, Phys. Rev. 84, 1124(1951).
	Resonance $Li^7(p,n)Be^7$ Level E_p Γ ~21.5 ~4.9 ~0.4		J. K. Bair et al., Phys. Rev. 85, 946 (1952).
	$Li(p,n)5^4Be$ Resonances: 2.2, 4.5		J. P. Blaser et al., Helv. Phys. Acta 24, 465(1951).
	Level $B^{10}(\gamma,d)Be^8 \rightarrow 2\alpha$ (broad) ~5.8? ppi		M. J. Brinkworth, E. W. Titterton, Phil. Mag. 42, 952(1951).
$_4Be^9_5$	$Li^6(t,p)Li^8$ Li^8 identified $E_t = 0.35$		C. D. Moak et al., Phys. Rev. 85, 928 (1952).
	Levels $\begin{cases} Li^7(d,n)Be^8 \\ Li^7(d,p)Li^8 \end{cases}$ 17.22, 17.45, 17.80, 18.3 pc		L. M. Baggett, S. J. Bame, Jr., Phys. Rev. 85, 741A(1952).
	Level $Be^9(p,p)$ 2.57 a		N. P. Heydenburg et al., Phys. Rev. 85, 742A (1952).
$_4Be^{10}_6$	$p(\theta)$ $Be^9(d,p)$ I(0.0 and 3.37 levels) = 0, 1, 2, or 3 (+)		F. A. El-Bedewi, Proc. Phys. Soc. (London) A65, 64(1952).
$_5B^8_4$	τ $>3\times10^{-18}$ s n spread $Be^9(p,n)$		P. H. Stelson, W. M. Preston, Phys. Rev. 83, 469(1951).
	No levels $Be(p,n)$ for $E_p = 2-5.3$		T. M. Hahn et al., Phys. Rev. 85, 934 (1952).
$_5B^{9}_4$	Resonances $\begin{cases} Be^9(p,n)B^9 \\ Be^9(p,\gamma)B^{10} \end{cases}$ E_p Γ 2.57 4.72 ~0.5		T. M. Hahn et al., Phys. Rev. 85, 934 (1952).
	Level $B(p,p\gamma)$ 0.718 scin		R. B. Day, T. Huus, Phys. Rev. 85, 761A (1952).
$_5B^{10}_5$	Level $B^{10}(p,p)$ 2.34 a		N. P. Heydenburg et al., Phys. Rev. 85, 742A (1952).
$_5B^{11}_6$	γ's $B^{10}(d,p)$ 4.5, 6.7, 9.0 pair s		J. Terrell, G. C. Phillips, Phys. Rev. 83, 703(1951).
	$B^{10}(d,p\gamma)B^{11}$ $p\gamma(\theta)$ = constant $E_d = 1.8$		G. C. Phillips et al., Phys. Rev. 85, 742A(1952).
	Level $B^{11}(p,p)$ 2.06 a		N. P. Heydenburg et al., Phys. Rev. 85, 742A (1952).
C	σ_t(1.9 – 3.8 Mev) graph E_p σ_p Γ 2.09 2.4 ~0.04 2.95 2.6 ~0.14		R. Ricamo, W. Zünti, Helv. Phys. Acta 24, 419(1951).
	σ_t(14.1 Mev) 1.279		H. L. Poss et al., Phys. Rev. 85, 703A(1952).
$_6C^{11}_5$	Resonance $B^{10}(p,\alpha\gamma)$ 1.52		R. B. Day, T. Huus, Phys. Rev. 85, 761A (1952).
$_6C^{12}_6$	Level $Be(\alpha,n)$ γ 4.45 scin		S. A. E. Johansson, Phil. Mag. 43, 249 (1952).
	Resonances $B(p,\gamma)$ E_p Γ E_γ 0.162 4.45, 11.6 0.67 0.31 4.44, 12.0, 16.4 1.37 1.15 4.45, 12.7, 16.9 scin		T. Huus, R. B. Day, Phys. Rev. 85, 761A(1952).
	$B^{11}(p,n)20.4^m C$ Resonances: 3.7, 5.2, 5.9, 6.4		J. P. Blaser et al., Helv. Phys. Acta 24, 465(1951).
	γ $B^{11}(d,n)$ 4.5 pair s		J. Terrell, G. C. Phillips, Phys. Rev. 83, 703(1951).
	$C^{12}(\gamma,3\alpha)$ Be^8 intermediate?		R. Chastel, Compt. rend. 233, 1440(1951).
	Level $C^{12}(p,p)$ 4.20 a		N. P. Heydenburg et al., Phys. Rev. 85, 742A (1952).
	$\alpha(\theta)$ $N^{14}(d,\alpha)$ for 0 and 4.4 levels		W. M. Gibson, E. E. Thomas, Proc. Roy. Soc. (London) 210A, 543(1952).
$_6C^{13}_7$	$n(\theta)$ $C^{12}(n,n)$ Level J 8.20 $d_{3/2}$		R. Ricamo, Nuovo cimento 8, 893(1951).
	σ_s coh 4.5 (+) σ_s bound 5.5		W. C. Koehler, E. O. Wollan, Phys. Rev. 85, 491(1952).

$_6C_3^{15}$	γ ~5.5 a coin	E. L. Hudspeth, W. B. Rose, Phys. Rev. 85, 742A(1952). C^{14}(1.8 Mev d,p).
$_7N_7^{14}$	Resonance C^{12}(d,n)N^{13} E_0 Γ(kev) 1.435 ~6	K. Famularo et al., Phys. Rev. 85, 742A (1952).
	C^{13}(p,γ) Levels Γ(kev) 8.05 32.5 8.62 6 8.70 500 9.18 2.1 9.49 45	J. D. Seagrave, Phys. Rev. 85, 197(1952).
	C^{13}(p,n)10.1^{m}N Resonances: 4.0, 5.0, 6.2	J. P. Blaser et al., Helv. Phys. Acta 24, 465(1951).
	Levels N(p,p) 2.35, 3.95 a	N. P. Heydenburg et al., Phys. Rev. 85, 742A (1952).
	d(θ) N(d,d)	W. M. Gibson, E. E. Thomas, Proc. Roy. Soc. (London) 210A, 543(1952).
	σ(2 Mev n,p) = 0.07 (3.6 Mev n,p) = 0.15 σ(2 Mev n,α) = 0.01 (3.6 Mev n,α) = 0.02	W. Bollmann, W. Zünti, Helv. Phys. Acta 24, 517(1951).
$_7N_8^{15}$	Resonances N^{14}(n,α)B^{11} 2.26, 2.56, 2.75 N^{14}(n,p)C^{14} 2.26, 2.80	W. Bollmann, W. Zünti, Helv. Phys. Acta 24, 517(1951).
	p(θ) ppl N(d,p) Level I ground ½-, ³/₂-, ⁵/₂- 6.33 ³/₂-, ⁵/₂- ? 8.32 ½+, ³/₂+ 9.22 ½+, ³/₂+	W. M. Gibson, E. E. Thomas, Proc. Roy. Soc. (London) 210A, 543(1952). E_d = 7.89.
	γ's N^{14}(d,p) 4.4, 5.3, 6.4, 7.4, 8.5 pair s	J. Terrell, G. C. Phillips, Phys. Rev. 83, 703(1951).
O	σ_t(1.9 – 3.8 Mev) graph E_0 1.9, 3.75 Marked dip at 2.37	R. Ricamo, W. Zünti, Helv. Phys. Acta 24, 419(1951).
$_8O_7^{15}$	Capture γ's N(p,γ) 0.75 5.29 1.39 6.21 2.38 6.84 scin	C. H. Johnson et al., Phys. Rev. 85, 931 (1952); 85, 727A (1952).
$_8O_9^{17}$	σ_a(θ) O^{16}(n,n) Level Γ J 5.94 $p_{½}$ 6.36 0.18 $s_{½}$ 7.28 0.22 $d_{½}$ 7.73 0.80 $p_{³/₂}$ 8.29 0.28 $p_{½}$	E. Baldinger et al., Phys. Rev. 84, 1058 (1951); Helv. Phys. Acta 25, 142(1952).
	p(θ) ppl O(d,p) Level I ground ½+, ³/₂+ 0.88 ½+	E. J. Burge et al., Proc. Roy. Soc. (London) 210A, 534 (1952). E_d = 7.73.
$_8O_9^{17}$	O^{16}(d,pγ)O^{17} pγ(θ) = constant E_d = 1.7, 2.0	G. C. Phillips et al., Phys. Rev. 85, 742A(1952).
$_9F_{10}^{19}$	O^{18}(p,n)1.87^{h}F Resonances: 3.3, 3.8, 4.25, 5.1, 5.6, 6.2, 6.7	J. P. Blaser et al., Helv. Phys. Acta 24, 465(1951).
	Levels F(p,p) 1.53, 3.83 a	N. P. Heydenburg et al., Phys. Rev. 85, 742A (1952).
	σ_a(th n) 3.75	C. T. Hibdon, C. O. Muehlhause, ANL-4680 (Sept. 1951).
Ne	Levels Ne(p,p) 1.44, 4.36 a	N. P. Heydenburg et al., Phys. Rev. 85, 742A (1952).
$_{10}Ne_9^{19}$	τ 18.6^s	J. P. Blaser et al., Helv. Phys. Acta 24, 465(1951). F(p,n).
$_{10}Ne_{10}^{20}$	Resonances $\begin{cases} F^{19}(p,\alpha\gamma)O^{16} \\ F^{19}(p,n)Ne^{19} \end{cases}$ E_p = 0.2 – 5.4	H. B. Willard et al., Phys. Rev. 85, 849 (1952).
	F^{19}(p,n)18^{s}Ne Resonances: 4.8, 5.4, 5.8, 6.1, 6.5	J. P. Blaser et al., Helv. Phys. Acta 24, 465(1951).
	No n thresholds F^{19}(d,n) for E_d = 0.5 – 2	J. W. Butler, Phys. Rev. 85, 743A(1952).
	γ's F^{19}(d,n) 8.1, 9.3, 11.5 pair s	J. Terrell, G. C. Phillips, Phys. Rev. 83, 703(1951).
Na	σ_t(2 – 80 kev) graph E_0 2.8, 5.5 kev	C. T. Hibdon et al., Phys. Rev. 85, 595 (1952).
$_{11}Na_{12}^{23}$	μ 2.2167 I	T. Kanda et al., Phys. Rev. 85, 938(1952).
	Level Na(d,p) 3.67 a	N. P. Heydenburg et al., Phys. Rev. 85, 742A (1952).
$_{12}Mg_{12}^{24}$	Na^{23}(p,n)11.9^{m}Mg Resonances: 5.3, 5.6, 6.0, 6.2, 6.4	J. P. Blaser et al., Helv. Phys. Acta 24, 465(1951).
	(1.4γ)p(θ) Mg^{24}(p,pγ)	H. E. Gove, A. Hedgran, Phys. Rev. 85, 727A (1952).
	σ_a(th n) 0.033 osc	H. Pomerance, T. Arnette, ORNL-940 (1950); priv. comm. (1952).
$_{12}Mg_{13}^{25}$	New levels Al^{27}(d,α) 3.96, 4.12, 6.98, 7.85, 8.62, 9.06, 9.75, 10.78, 11.89 ppl	E. C. Toops et al., Phys. Rev. 85, 280 (1952).

$_{12}Mg^{25}_{13}$	σ_a(th n) 0.27	osc	H. Pomerance, T. Arnette, ORNL-940 (1950).
$_{12}Mg^{28}_{14}$	σ_a(th n) 0.06	osc	H. Pomerance, T. Arnette, ORNL-940 (1950).
$_{13}Al^{24}_{11}$	τ 2.3^s Mg(p,n) Delayed α emitter $E_p = 15.4$		A. C. Birge, Phys. Rev. 85, 753A(1952).
$_{13}Al^{26}_{13}$	τ 6.5^s		L. Katz, A. G. W. Cameron, Phys. Rev. 84, 1115(1951).
$_{13}Al^{26?}_{13}$	Mg(p,n)7.3^{s}Al Resonances: 5.5, 5.8, 6.0, 6.3, 6.5		J. P. Blaser et al., Helv. Phys. Acta 24, 465(1951).
$_{13}Al^{27}_{14}$	μ 3.6395	I	T. Kanda et al., Phys. Rev. 85, 938(1952).
	Levels Al(p,p) 1.02, 2.30, 2.89, 3.32, 4.48	a	N. P. Heydenburg et al., Phys. Rev. 85, 742A (1952).
	Levels Al(p,p) 22 tentative values		E. M. Reilley et al., Phys. Rev. 85, 704A(1952).
$_{14}Si^{28}_{14}$	Al^{27}(p,n)4.9^{s}Si Resonances: 6.2, 6.4		J. P. Blaser et al., Helv. Phys. Acta 24, 465(1951).
	σ_a(th n) 0.06	osc	H. Pomerance, T. Arnette, ORNL-940 (1950).
$_{14}Si^{29}_{15}$	σ_a(th n) 0.27	osc	H. Pomerance, T. Arnette, ORNL-940 (1950).
$_{14}Si^{30}_{16}$	γ's $Al^{27}(\alpha,p)$ γ_1 2.32 γ_2 3.6 γ_3 1.28 γ_4 ~2.7 Coincidences $p_1\gamma_1$, $p_2\gamma_2$, $p_3\gamma_2$, $p_3\gamma_3$, $p_3\gamma_4$		R. C. Allen et al., Phys. Rev. 84, 1203 (1951).
	σ_a(th n) 0.41	osc	H. Pomerance, T. Arnette, ORNL-940 (1950).
$_{14}Si^{31}_{17}$	τ 2.65 ± 0.01^h β^- 1.471	sl	H. T. Motz, Phys. Rev. 85, 501(1952). P^{31}(pile n,p); chem.
$_{15}P^{30}_{15}$	Levels Si^{29}(d,n) 0.75, 1.46, 2.00	ppl	C. E. Mandeville et al., Phys. Rev. 85, 193(1952); 85, 725A (1952).
$_{15}P^{31}_{16}$	μ 1.1308	I	T. Kanda et al., Phys. Rev. 85, 938(1952).
	Levels Si^{30}(d,n) 0.33, 1.19, 2.22, 3.41	ppl	C. E. Mandeville et al., Phys. Rev. 85, 193(1952); 85, 725A (1952).
$_{15}P^{31}_{16}$	σ_a(th n) 4.67		C. T. Hibdon, C. O. Muehlhause, ANL-4680 (Sept. 1951).
$_{15}P^{32}_{17}$	β^- 1.697	sl	H. T. Motz, Phys. Rev. 85, 501(1952).
	β^- 1.704 Bump at $H\rho \sim 1000$ not found by S(d) or P(n)	sl	E. N. Jensen et al., Phys. Rev. 85, 112 (1952).
$_{15}P^{33}_{18}$	τ 24.8^d β^- 0.26	sl	E. N. Jensen et al., Phys. Rev. 85, 112 (1952). S(n,p); S(γ,p).
S	Variation in terrestrial S^{32}/S^{34} ratio Same ratio for igneous and meteoritic samples		J. Macnamara et al., Can. J. Chem. 30, 73(1952).
$_{17}Cl^{35}_{18}$	μ 0.82110	I	H. E. Walchli et al., Phys. Rev. 85, 922 (1952).
	q coupling ratio $TlCl^{35}/TlCl^{37}$ 1.2691 ± 0.0004	M	R. O. Carlson et al., Phys. Rev. 85, 784 (1952).
	1.270 ± 0.005	M	H. J. Zeiger, D. I. Bolef, Phys. Rev. 85, 788(1952).
$_{17}Cl^{36}_{19}$	I 2 q −0.0164	Mic Mic	D. A. Gilbert, Phys. Rev. 85, 716A(1952).
$_{18}A^{36}_{18}$	A^{40}/A^{36} [inner earth / atmospheric] >1		G. Boato, Nuovo cimento 9, 44(1952).
$_{18}A^{38}_{20}$	Resonances Cl^{37}(p,n)A^{37} over 100 found for $E_p = 1.64 - 2.51$		W. A. Schoenfeld et al., Phys. Rev. 85, 873(1952).
	Cl(p,n)34^{d}A Excitation function		J. P. Blaser et al., Helv. Phys. Acta 24, 465(1951).
$_{18}A^{41}_{23}$	$\beta\gamma$ delay 6.7×10^{-9s}	scin	L. G. Elliott, Phys. Rev. 85, 942(1952).
	p(θ) ppl A(d,p) Level / I ground / ½-, ½- 1.34 / ½+ ?		W. M. Gibson, E. E. Thomas, Proc. Roy. Soc. (London) 210A, 543(1952). E_d = 7.81.
$_{19}K^{40}_{21}$	$g_1(K^{40})/g_1(K^{39})$ −1.2434 ± 0.0003	M	J. T. Eisinger, B. Bederson, Phys. Rev. 85, 716A(1952).
	σ_a(th n) 75	osc	H. Pomerance, priv. comm. (1952).
$_{20}Ca^{40}_{20}$	σ_a(th n) ≤0.22 Ca^{43} contribution unknown	osc	H. Pomerance, priv. comm. (1952).
$_{20}Ca^{41}_{21}$	τ 1.2×10^{5y}* K x ray	pc	F. Brown et al., Phys. Rev. 84, 1243(1951). *Based on $\sigma[Ca^{40}(n,\gamma)Ca^{41}] = 0.35$ and K fluorescence yield = 0.1.
$_{20}Ca^{42}_{22}$	σ_a(th n) 40	osc	H. Pomerance, priv. comm. (1952).

$_{20}Ca^{48}_{28}$	τ	$>2 \times 10^{16}$y	J. W. Jones, T. P. Kohman, Phys. Rev. 85, 941(1952).
Ti	σ_s(th n)	3.96	C. T. Hibdon, C. O. Muehlhause, ANL-4680 (Sept. 1951).
	σ_t(3000 ev)	5.02	C. T. Hibdon, ANL-4602 (Mar. 1951).
	σ_t(2 – 40 kev) graph E_0	19, 23 kev	C. T. Hibdon et al., Phys. Rev. 85, 595 (1952).
$_{22}Ti^{46}_{24}$	σ_a(th n)	0.57 osc	H. Pomerance, T. Arnette, ORNL-940 (1950).
$_{22}Ti^{47}_{25}$	σ_a(th n)	1.62 osc	H. Pomerance, T. Arnette, ORNL-940 (1950).
$_{22}Ti^{48}_{26}$	σ_a(th n)	7.98 osc	H. Pomerance, T. Arnette, ORNL-940 (1950).
$_{22}Ti^{49}_{27}$	σ_a(th n)	1.80 osc	H. Pomerance, T. Arnette, ORNL-940 (1950).
$_{22}Ti^{49?}_{27}$	I μ	7/2? I −1.1024 I	C. D. Jeffries et al., Phys. Rev. 85, 478 (1952).
$_{22}Ti^{50}_{28}$	σ_a(th n)	0 ± 0.2 osc	H. Pomerance, T. Arnette, ORNL-940 (1950).
V	σ_t(2 – 25 kev) graph E_0	7, 13, 17, 23? kev	C. T. Hibdon et al., Phys. Rev. 85, 595 (1952).
$_{23}V^{50}_{27}$	g_I	+0.55704 I	H. E. Walchli et al., Phys. Rev. 85, 922 (1952).
$_{24}Cr^{53}_{29}$	I μ	3/2 para ~(±)0.45	B. Bleaney, K. D. Bowers, Proc. Phys. Soc. (London) A64, 1135(1951).
Mn	σ_t(2 – 80 kev) graph E_0	2.8, 8, 23, 38 kev (60, 67, 78) ?	C. T. Hibdon et al., Phys. Rev. 85, 595 (1952).
$_{25}Mn^{53}_{28}$	Level	Cr^{53}(p,n) 0.40	P. H. Stelson, W. M. Preston, Phys. Rev. 83, 469(1951).
Fe	σ_t(77 – 800°K) graphs E_n	~0.002 ev	R. Latham, J. M. Cassels, Proc. Phys. Soc. (London) A65, 241(1952).
	σ_t(3000 ev)	7.00	C. T. Hibdon, ANL-4602 (Mar. 1951).
	σ_t(2 – 24 kev) graph E_0	8.5, 16? kev	C. T. Hibdon et al., Phys. Rev. 85, 595 (1952).
$_{26}Fe^{54}_{28}$	σ_a(th n)	2.18 osc	H. Pomerance, priv. comm. (1952).
$_{26}Fe^{54}_{30}$	σ_a(th n)	2.55 osc	H. Pomerance, priv. comm. (1952).
$_{26}Fe^{57}_{31}$	σ_a(th n)	2.36 osc	H. Pomerance, priv. comm. (1952).
$_{26}Fe^{58}_{32}$	σ_a(th n)	2.5 osc	H. Pomerance, priv. comm. (1952).
$_{26}Fe^{59}_{33}$	γ 2.5% (0.195γ)(1.0γ)	0.195 scin	F. R. Metzger, Phys. Rev. 85, 727A(1952).
Co	σ_s(th n) σ_t(10.0 ev) (19.5 ev) (2700 ev) (3000 ev)	8.34 10.29 8.52 4.09 4.55	C. T. Hibdon, ANL-4602 (Mar. 1951).
	σ_t(2 – 100 kev) graph E_0	5.5, 8?, 29.5 kev	C. T. Hibdon et al., Phys. Rev. 85, 595 (1952).
$_{27}Co^{60}_{33}$ 5.2y	μ	3.0 $\gamma(\theta,T)$	B. Bleaney et al., Phys. Rev. 85, 688 (1952).
		3.2 $\gamma(\theta,T)$	C. J. Gorber et al., Physica 18, 135 (1952).
	$\gamma\gamma(\theta)$ 1.1γ, 1.3γ	≥octupole	S. Das, S. K. Sen, Indian J. Phys. 25, 451(1951).
Ni	σ_t(2 – 41 kev) graph E_0	4.5, 17, 30? kev	C. T. Hibdon et al., Phys. Rev. 85, 595 (1952).
	Level	Ni(p,p) 1.44 a	N. P. Heydenburg et al., Phys. Rev. 85, 742A (1952).
	13 levels unassigned to isotope	Ni(p,p)	R. Ely, Jr., et al., Phys. Rev. 85, 704A(1952).
$_{28}Ni^{60}_{32}$	Levels 1.338, 1.475, 2.497	Ni(p,p)	R. Ely, Jr., et al., Phys. Rev. 85, 704A(1952).
$_{30}Zn^{67}_{37}$	I μ	5/2 I +0.87376 ±0.00013	S. S. Dharmatti, H. E. Weaver, Jr., Phys. Rev. 85, 927(1952).
Ge	σ_t(10.0 ev) (19.5 ev) (120 ev) (345 + 2400 ev) (2700 ev) (3800 ev)	5.13 4.08 4.93 4.01 2.54 4.47	C. T. Hibdon, ANL-4602(Mar. 1951).
$_{32}Ge^{70}_{38}$	σ_a(th n)	3.3 osc	H. Pomerance, ORNL-577(1949); Phys. Rev. 78, 814(1950).
$_{32}Ge^{72}_{40}$	σ_a(th n)	0.94 osc	H. Pomerance, ORNL-577(1949); Phys. Rev. 78, 814(1950).
$_{32}Ge^{73}_{41}$	σ_a(th n)	13.7 osc	H. Pomerance, ORNL-577(1949); Phys. Rev. 78, 814(1950).

$_{32}Ge^{74}_{42}$	σ_a(th n) 0.60	osc	H. Pomerance, ORNL-577(1949); Phys. Rev. 78, 814(1950).
$_{32}Ge^{76}_{44}$	σ_a(th n) 0.35	osc	H. Pomerance, ORNL-577(1949); Phys. Rev. 78, 814(1950).
$_{32}Ge^{77}_{45}$ 59^s	γ 0.380	scin	A. C. G. Mitchell, A. B. Smith, Phys. Rev. 85, 153(1952). Ge(slow n).
12^h	β^- 2.2 complex γ 0.263	s s	A. C. G. Mitchell, A. B. Smith, Phys. Rev. 85, 153(1952).
As	σ_i(2700 ev) 7.35 (3000 ev) 6.77		C. T. Hibdon, ANL-4602 (Mar. 1951).
$_{33}As^{71}_{38}$	τ ~50^h		D. F. Bracher, A. R. Crathorn, Nature 169, 364(1952). Ge(d,n); ms.
$_{33}As^{75}_{42}$	I ½ I μ +1.4354 I		C. D. Jeffries et al., Phys. Rev. 85, 478(1952).
$_{33}As^{76}_{43}$	γ 1.0* 0.555 sl; 0.095* 0.648 pe$^-$, 0.25* 1.21 Cpt 0.016* 1.41 0.055* 2.06		P. Hubert, J. phys. radium 12, 823 (1951). *Relative intensity.
$_{33}As^{78}_{45}$	β^- ~2.1 No γ	a	P. J. Van der Haack et al., Physica 18, 20(1952). Se(n), Se(d); chem.
$_{34}Se^{74}_{40}$	σ_a(th n) 44	osc	H. Pomerance, T. Arnette, ORNL-940 (1950).
$_{34}Se^{76}_{42}$	σ_a(th n) 82	osc	H. Pomerance, T. Arnette, ORNL-940 (1950).
$_{34}Se^{77}_{43}$	I ½	B	S. P. Davis, F.A. Jenkins, Phys. Rev. 83, 1269(1951).
	σ_a(th n) 40	osc	H. Pomerance, T. Arnette, ORNL-940 (1950).
$_{34}Se^{78}_{44}$	I 0	B	S. P. Davis, F. A. Jenkins, Phys. Rev. 83, 1269(1951).
$_{34}Se^{79}_{45}$ 6.5×10^4^{y}	I ½ q 1.2	Mic	W. A. Hardy et al., Phys. Rev. 85, 494(1952). Fission; chem.
$_{37}Rb^{85}_{48}$	μ 1.3486	I	H. E. Walchli et al., Phys. Rev. 85, 922 (1952).
	$\Delta\nu(Rb^{87})/\Delta\nu(Rb^{85})$ = 2.251413 ± 0.000005	M	S. A. Ochs, P. Kusch, Phys. Rev. 85, 145 (1952).

$_{37}Rb^{86}_{49}$	$\beta\gamma(\theta)$ b = +0.13		D. T. Stevenson, M. Deutsch, Phys. Rev. 83, 1202(1951).
$_{38}Sr^{85}_{47}$ 70^m	K 14% γ 84.7% 0.0075 α = large E3 0.150 84.7% 0.225 M1 α~0.026, K/L~5 1.3% 0.233 M4 (0.150γ)X (Rb) No (0.233γ)X		A. W. Sunyar et al., Phys. Rev. 85, 734A(1952); priv. comm. Sr^{84}(pile n).
$_{38}Sr^{85}_{47}$ 65^d	γ 0.514 s;ce$^-$,pe$^-$ α_K = 0.007, K/L ~12 $\tau > 1^{\mu s}$ No e$^-$ with 0.12 < E < 0.2 X/γ ~1		W. S. Emmerich, J. D. Kurbatov, Phys. Rev. 85, 149 (1952); 85, 733A (1952).
	K γ 100% 0.513 scin α = 0.008 M2 τ = 0.9$^{\mu s}$		A. W. Sunyar et al., Phys. Rev. 85, 734A(1952); priv. comm. Rb(d); chem.
Zr	σ_i(19.5 ev) 6.23 (120 ev) 6.30 (345 + 2400 ev) 5.83 (2700 ev) 6.03 (3000 ev) 6.23		C. T. Hibdon, ANL-4602 (Mar. 1951).
$_{41}Nb^{91}_{50}$ 64^d	τ 62^d γ 0.105 K/L + M = 2.1		P. Preiswerk, P. Stähelin, Helv. Phys. Acta 24, 300 (1951).
$_{41}Nb^{92}_{51}$	K >99.95% β ≤0.05% γ >99.95% 0.930		P. Preiswerk, P. Stähelin, Helv. Phys. Acta 24, 300 (1951).
$_{41}Nb^{94}_{53}$	$\tau_{\frac{1}{2}}$ >5 ×10^{4y}		R. E. Hein et al., Phys. Rev. 85, 138 (1952).
$_{41}Nb^{95}_{54}$ 90^h	τ 80^h γ 0.232 sl;pe$^-$ K/L + M = 3.5		P. Preiswerk, P. Stähelin, Helv. Phys. Acta 24, 300 (1951).
$_{41}Nb^{96}_{55}$	τ 23^h β^- 8% 0.370 sl 92% 0.750 γ sl;ce$^-$		P. Preiswerk, P. Stähelin, Helv. Phys. Acta 24, 300 (1951).

I(%)	E_γ	$\alpha \times 10^4$
7	0.216	<230
10	0.238	<160
27	0.451	40
61	0.560	16
5	0.725?	?
100	0.770	12
6	0.804	13
16	0.840	12
52	1.078	5.6
32	1.187	3.1

$_{42}Mo^{93}_{51}$	$(0.24e^-)\gamma(\theta)$ b = +0.33 $\gamma\gamma(\theta)$ b = +0.20	D. T. Stevenson, M. Deutsch, Phys. Rev. 83, 1202(1951).
$_{42}Mo^{94}_{52}$	σ_a(th n) 1.2 osc	H. Pomerance, priv. comm. (1952).
$_{42}Mo^{97}_{55}$	σ_a(th n) 2.1 osc	H. Pomerance, priv. comm. (1952).
$_{42}Mo^{98}_{56}$	σ_a(th n) 0.38 osc	H. Pomerance, priv. comm. (1952).
$_{42}Mo^{100}_{58}$	σ_a(th n) 0.5 osc	H. Pomerance, priv. comm. (1952).
	σ(th n,γ)14.6^{m}Mo 0.23	V. Hummel, ANL-4659 (June 1951).
$_{43}Tc^{94}_{51}$	51.5^m activity now assigned to Tc^{96}, q.v.	H. A. Medicus, H. T. Easterday, Phys. Rev. 85, 735A(1952).
$_{43}Tc^{96}_{53}$	τ_1 51.5^m Formerly assigned to Tc^{94}	H. A. Medicus, H. T. Easterday, Phys. Rev. 85, 735A(1952). Mo^{96}(4-Mev p,n).
	Γ(0.8 level) $\lesssim$ 0.02 ev scin τ(0.8 level) $\geq 0.5\times10^{-13}$s	F. R. Metzger, Phys. Rev. 83, 842(1951).
$_{43}Tc^{99}_{56}$	μ +5.6586 I	H. Walchli et al., Phys. Rev. 85, 479(1952).
5.9^h	τ dependent on chemical state	K. T. Bainbridge et al., Phys. Rev. 84, 1260(1951).
$_{45}Rh^{103}_{58}$	I ½ S μ $\sim$ -0.1 S	H. Kuhn, G. K. Woodgate, Proc. Phys. Soc. (London) A64, 1090(1951).
$_{45}Rh^{104}_{61}$	β^- 3% 2.0 sl 12% 2.44 11% 3.1 69% 3.53 γ 1* 0.513 sl;pe$^-$ $\alpha_k = 3.5\times10^{-3}$, K/L = 8 0.53* 0.624 $\alpha_k = 2.1\times10^{-3}$ 0.03* 0.87 0.08* 1.045 0.025* 1.55 0.01** 2.41**	D. E. Alburger, Phys. Rev. 85, 734A(1952). *Relative intensities from pe$^-$. **Priv. comm.
$_{46}Pd^{108}_{62}$	$\tau_{\beta\beta}$ $>1.1\times10^{17}$ cc	R. G. Winter, Phys. Rev. 85, 687(1952).
$_{46}Pd^{110}_{64}$	$\tau_{\beta\beta}$ $>6\times10^{17}$ cc	R. G. Winter, Phys. Rev. 85, 687(1952).
Ag	σ_a(th n) 5.72	C. T. Hibdon, ANL-4602 (Mar. 1951).
$_{47}Ag^{105}_{58}$	γ's sl;ce$^-$ γ_1 0.0625 K/L > 5 γ_2 0.280 K/L = 8 γ_3 0.343 K/L = 5.8 γ_4 0.440 K/L = 7 Weak: 0.154, 0.181, 0.391 $\gamma_1\gamma_2$, $\gamma\gamma$	R. W. Hayward, Phys. Rev. 85, 760A(1952); priv. comm. Rh(α,2n); Pd(d).
$_{47}Ag^{106}_{59}$	γ's sl,ce$^-$ 0.220 0.717 0.409 0.815 0.511 1.04 K/L = 8 1.235 0.620 1.55 $\gamma\gamma$	R. W. Hayward, Phys. Rev. 85, 760A(1952); priv. comm. Rh(α,n); Pd(d).
$_{47}Ag^{108}_{61}$	β^- 1.49 scin β^-/K $\sim$2 γ $\sim$1* 0.19 scin $\sim$1* 0.42 $\sim$4* 0.61 $\gamma\gamma$, no $\beta\gamma$ Pd K X-rays	M. Goodrich, E. C. Campbell, Phys. Rev. 85, 742A(1952); priv. comm. *Relative intensities.
$_{47}Ag^{110}_{63}$	γ (0.656) sl;ce$^-$ K/L = 14	W. C. Kelly, Phys. Rev. 85, 101(1952).
270^d	γ 1.00* 0.652 s;Cpt 1.03* 0.886 0.26* 1.388 0.22* 1.484 *Relative intensities	B. S. Dzhelepov et al., Doklady Akad. Nauk, S.S.S.R. 77, 597(1951); Guide to Russ. Sci. Lit. 4, 369(1951).
$_{47}Ag^{115}_{68}$	τ 21^m p {(90.8%)2.3^{d}Cd (9.2%)43^{d}Cd	A. C. Wahl,and N. A. Bonner, Phys. Rev. 85, 570(1952).
$_{48}Cd^{109}_{61}$	γ 0.087 sl;ce$^-$ (39^{s}Ag) $\alpha_K \sim 6$ K/L = 0.75	O. Huber et al., Helv. Phys. Acta 25, 3 (1952). Ag(p,n).
$_{48}Cd^{115}_{67}$ 43^d	β^- 1.5 a p (<0.02%)4.5^{h}In	A. C. Wahl, N. A. Bonner, Phys. Rev. 85, 570(1952).
$_{48}Cd^{115}_{67}$ 2.33^d	τ 2.21 ± 0.04^d β_1 15% 0.5 a β_2 85% 1.1 a γ $\sim$0.55 a $\beta_1\gamma$	A. C. Wahl, N. A. Bonner, Phys. Rev. 85, 570(1952). Cd(n,γ); Cd(γ,n); and fission.
$_{49}In^{111}_{62}$	γ Eγ α_K K/L 0.173 0.104 6.6 0.247 0.054 5.3	O. Huber et al., Helv. Phys. Acta 25, 3 (1952). Cd(p,n).
$_{49}In^{114}_{65}$ 50^d	γ 0.192 sl;ce$^-$ K/L = 0.96	O. Huber et al., Helv. Phys. Acta 25, 3 (1952). Cd(p,n).
	γ (0.192) sl;ce$^-$ K/L = 1.30	W. C. Kelly, Phys. Rev. 85, 101(1952).
$_{50}Sn^{124}_{74}$	$\tau_{\beta\beta}$ $>1.7\times10^{17}$y	M. I. Kalkstein, W. F. Libby, Phys. Rev. 85, 368(1952).
$_{51}Sb^{120}_{69}$	6.0^d Sb^{120} assignment questioned	L. Katz, A. G. W. Cameron, Can J. Phys. 29, 518(1951).

$_{51}Sb^{122}_{71}$ 2.8^d	γ 0.58	a	L. Katz, A. G. W. Cameron, Can. J. Phys. 29, 518(1951).
Te	Isotope shift Increase at $Te^{126} - Te^{124}$	S	J. S. Ross, K. Murakawa, Phys. Rev. 85, 559(1952).
$_{52}Te^{120}_{68}$	σ_a(th n) 68	osc	H. Pomerance, T. Arnette, ORNL-940 (1950); priv. comm. (1952).
$_{52}Te^{122}_{70}$	σ_a(th n) 2.7	osc	H. Pomerance, T. Arnette, ORNL-940 (1950).
$_{52}Te^{123}_{71}$ 90^d	$\gamma\gamma$ delay $<10^{-9}$s		F. K. McGowan, Phys. Rev. 85, 142 (1952).
$_{52}Te^{123}_{71}$	σ_a(th n) 390	osc	H. Pomerance, T. Arnette, ORNL-940 (1950).
$_{52}Te^{124}_{72}$	σ_a(th n) 6.5	osc	H. Pomerance, T. Arnette, ORNL-940 (1950).
$_{52}Te^{125}_{73}$ 58^d	γ 0.110 $\alpha_K = 160$ (0.035) $\alpha_K = 11.4$ M1 K/L = 7.1, L/M = 5.3 sl,scin,pc		J. C. Bowe, P. Axel, Phys. Rev. 85, 858(1952); 85, 734A(1952).
	$\gamma\gamma$ delay $<2 \times 10^{-9}$s		F. K. McGowan, Phys. Rev. 85, 142 (1952).
$_{52}Te^{125}_{73}$ stable	μ -0.7 S $\mu(Te^{125})/\mu(Te^{123}) = 1.186$		J. S. Ross, K. Murakawa, Phys. Rev. 85, 559(1952).
$_{52}Te^{125}_{73}$	σ_a(th n) 1.5	osc	H. Pomerance, T. Arnette, ORNL-940 (1950).
$_{52}Te^{126}_{74}$	σ_a(th n) 0.77	osc	H. Pomerance, T. Arnette, ORNL-940 (1950); priv. comm. (1952).
$_{52}Te^{128}_{76}$	σ_a(th n) 0.3	osc	H. Pomerance, T. Arnette, ORNL-940 (1950); priv. comm. (1952).
$_{52}Te^{130}_{78}$	σ_a(th n) 0.5	osc	H. Pomerance, T. Arnette, ORNL-940 (1950).
$_{53}I^{131}_{78}$	β^- 1* 0.246 2* 0.328 γ 0.638 0.720 $(0.080\gamma)(0.284\gamma)(\theta)$ constant	a$\beta\gamma$ scin	P. E. Cavanagh, Phil. Mag. 43, 221 (1952). *Relative intensities. D. Schiff, Phys. Rev. 85, 727A (1952).
$_{56}Ba^{124}_{68}$	σ_a(th n) 2	osc	H. Pomerance, priv. comm. (1952).
$_{56}Ba^{125}_{69}$	σ_a(th n) 5.6	osc	H. Pomerance, priv. comm. (1952).
$_{56}Ba^{126}_{70}$	σ_a(th n) 0.4	osc	H. Pomerance, priv. comm. (1952).
$_{56}Ba^{127}_{71}$ 2.60^m	γ (0.662) K/L = 4.57	sl;ce$^-$	W. C. Kelly, Phys. Rev. 85, 101(1952).
stable	σ_a(th n) 4.9	osc	H. Pomerance, priv. comm. (1952).
$_{56}Ba^{128}_{72}$	σ_a(th n) 0.68	osc	H. Pomerance, priv. comm. (1952).
$_{57}La^{140}_{83}$	β^- ~2.3 γ_1 <1%* 0.093 γ_2 3% 0.335 γ_3 22% 0.49 γ_4 16% 0.82 γ_5 56% 1.62 γ_6 3% 2.55 $\gamma_3\gamma_5$, $\gamma_4\gamma_5$, $\gamma_2\gamma_6$	scin scin	R. C. Bannerman et al., Phil. Mag. 42, 1097(1951). *% of γ's.
$_{58}Ce^{136}_{78}$	σ_a(th n) 25	osc	H. Pomerance, priv. comm. (1952).
$_{58}Ce^{138}_{80}$	σ_a(th n) 8.7	osc	H. Pomerance, ORNL-1164(1951); priv. comm. (1952).
$_{58}Ce^{140}_{82}$	σ_a(th n) 0.63	osc	H. Pomerance, ORNL-1164(1951); priv. comm. (1952).
$_{58}Ce^{142}_{84}$	σ_a(th n) 1.76	osc	H. Pomerance, ORNL-1164(1951); priv. comm. (1952).
$_{58}Ce^{144}_{86}$	β^- 97% 0.307 3% 0.446 γ 0.0547 0.0794 K/L = 6.3 0.134 K/L = 8.3 0.231 K/L = 1.7	s	L. S. Cheng et al., Phys. Rev. 85, 487(1952). Fission; chem.
	γ (0.132) K/L = 5.3	sl;ce$^-$	W. C. Kelley, Phys. Rev. 85, 101(1952);
$_{59}Pr^{140}_{81}$	β^+ 2.23 γ/K x ray <10% β^+/K ~1.6 assuming K capt/L capt = 7	s$\pi\sqrt{2}$	C. I. Browne et al., Phys. Rev. 85, 146 (1952). Pr(19 Mev d)Nd^{140} $\rightarrow Pr^{140}$; ion chem.
$_{59}Pr^{144}_{85}$	β^- 3% 0.605 12% 1.30 85% 3.00	s	L. S. Cheng et al., Phys. Rev. 85, 487(1952).
	β^- 2.97	sπ	F. T. Porter, C. S. Cook, Phys. Rev. 85, 733A(1952).
Nd	<0.02 α's/sec(gm of Nd) <0.003 β's/sec(gm of Nd)		G. I. Mulholland, T. P. Kohman, Phys. Rev. 85, 144(1952).
$_{60}Nd^{140}_{80}$	$E_{dis} \sim 0.1$, K capt/L capt = 2.8 from K x-ray intensities in $Nd^{140} \rightarrow Pr^{140} \rightarrow Ce^{140}$		C. I. Browne et al., Phys. Rev. 85, 146 (1952). Pr(19 Mev d); ion chem.
$_{60}Nd^{147}_{87}$	γ 0.0918 $K/L_I = 6.4$	sπ	J. W. Mihelich, E. L. Church, Phys. Rev. 85, 690(1952).

$_{60}Nd^{150}_{90}$	τ_β >2×10^{15}y		G. I. Mulholland, T. P. Kohman, Phys. Rev. 85, 144(1952).
$_{61}Pm^{149}_{87}$	τ_2 48^d		J. K. Long, M. L. Pool, Phys. Rev. 85, 137(1952). Nd^{148}(6-Mev p,n); rare earth chem.
	β^- 0.6	a	
	1.7		
	γ ~0.54	a	
$_{61}Pm^{150}_{89}$	τ 2.7^h		J. K. Long, M. L. Pool, Phys. Rev. 85, 137(1952). Nd^{150}(6-Mev p,n).
	β^- 2.4	a	
$_{63}Eu^{152}_{89}$ 9.2^h	γ 0.1219	sπ;ce$^-$	H. B. Keller, J. M. Cork, Phys. Rev. 84, 1079(1951).
	K/L ~ 4	(Sm)	
	0.3441		
	K/L ~ 10	(Gd)	
5.3^y	New assignment of γ's		
$_{63}Eu^{154}_{91}$ 5.4^y	New assignment of γ's		H. B. Keller, J. M. Cork, Phys. Rev. 84, 1079(1951).
$_{64}Gd^{150}_{86}$	τ long		S. G. Thompson et al., Phys. Rev. 85, 758A (1952).
	α 2.7		
$_{64}Gd^{159}_{95}$	18^h produced by Gd(γ)		F. D. S. Butement, Proc. Phys. Soc. (London) A64, 395 (1951).
$_{65}Tb^{150}_{85}$	γ 0.085	scin	F. K. McGowan, Phys. Rev. 85, 151(1952).
	α_K = 1.6	E2	
	(~0.9β)(0.085γ) delay 1.8×10^{-9}s		F. K. McGowan, Phys. Rev. 85, 142(1952).
Dy	7^m α activity formerly assigned to Tb or Gd now assigned to Dy. E_α = 4.2.		S. G. Thompson et al., Phys. Rev. 85, 758A (1952).
$_{66}Dy^{155}_{89}$ 2.4^h	γ 0.0951	sπ	J. W. Mihelich, E. L. Church, Phys. Rev. 85, 690(1952).
	K:L_I:L_{III} = 6.4:1.0:<0.2		
	γ 0.095	scin	F. K. McGowan, Phys. Rev. 85, 151(1952).
	$\alpha_K \leq$ 2.9		
	β(0.095γ) delay <0.8×10^{-8}s		F. K. McGowan, Phys. Rev. 85, 142(1952).
$_{67}Ho^{166}_{99}$	τ >30^y		F. D. S. Butement, Proc. Phys. Soc. (London) A65, 254 (1952). Ho(n,γ); chem. (β_1 or β_2)(γ_4 or γ_5), $\beta_3\gamma_2$, (γ_4,γ_5)(γ_3) Er K x ray.
	β_1 46% 0.18	a$\beta\gamma$	
	β_2 46% 0.28	a$\beta\gamma$	
	β_3 8% 1.1	a	
	γ_1 0.095	scin	
	γ_2 0.212		
	γ_3 0.280		
	γ_4 0.725		
	γ_5 0.830		
27.3^h	γ 0.081	scin	F. K. McGowan, Phys. Rev. 85, 151(1952).
	α_K = 1.9	E2	
	γ 0.0807	sπ	J. W. Mihelich, E. L. Church, Phys. Rev. 85, 690(1952).
	K: L_I: L_{II}:L_{III} = 0.13:<0.1:<0.72:1		
Er	Isotope shifts (170-168):(168-166): (166-164) = 1:0.9:0.9	S	K. Murakawa, S. Suwa, Phys. Rev. 85, 683(1952).
$_{68}Er^{171}_{103}$	γ 0.1128 K/L ~10	sπ; ce$^-$	H. B. Keller, J. M. Cork, Phys. Rev. 84, 1079(1951).
	0.1179 ~0.5		
	0.1255 ~2		
	0.1764		
	0.2946 ~10		
	0.3075 ~10		
	0.4197		
$_{69}Tm^{170}_{101}$	β_1 0.876	sl;$\beta\gamma$	R. Richmond, H. Rose, Phil. Mag. 43, 367(1952).
	β_2 0.970	sl	
	β_1 F-K plot linear		
	γ 0.0848	sπ	J. W. Mihelich, E. L. Church, Phys. Rev. 85, 690(1952).
	K: L_I: L_{II}:L_{III} = 0.29:<0.1:0.83:1		
	γ 0.085	scin	F. K. McGowan, Phys. Rev. 85, 151 (1952).
	α_K = 1.5	E2	
$_{71}Lu^{170}_{105}$ 3.75^h	β^- 1.1		G. Scharff-Goldhaber et al., Phys. Rev. 85, 734A(1952).
	1.2		
	γ 0.089	scin	
	α = large		
	K/L~0.1	E2	
	No γ with 0.6<E_γ<1		
	(1.1β)(0.089γ) delay <1$^{\mu s}$		
	γ 0.0889	sπ	J. W. Mihelich, E. L. Church, Phys. Rev. 85, 690(1952).
	K: L_{II}:L_{III} = 0.24:0.71:1		
$_{71}Lu^{177}_{106}$	γ 0.112	scin	F. K. McGowan et al., Phys. Rev. 85, 152(1952).
	α_K = 0.81	E2	
	$\tau < 5 \times 10^{-10}$s		
	0.206		
	α_K = 0.04	E1	
	4.5% 0.318		
	$\gamma\gamma(\theta)$ b = −0.213		
Hf	Relative abundances* 170, 171 <0.004% 172, 173 <0.005% 175 <0.006%		H. E. Duckworth et al., Phys. Rev. 85, 929(1952). *Assuming Hf^{174} = 0.18%.
	σ_i(10.0 ev) 17.0		C. T. Hibdon, ANL-4602 (Mar. 1951).
	(120 ev) 13.1		
	(345 + 2400 ev) 14.4		
	(2700 ev) 14.8		
	(3000 ev) 14.8		
$_{73}Ta^{183}_{110}$	τ 4.83^d		F. D. S. Butement, Proc. Phys. Soc. (London) A64, 395 (1951). W(γ); chem.
W	σ_i(2700 ev) 8.45		C. T. Hibdon, ANL-4602 (Mar. 1951).
	(3000 ev) 8.31		
$_{74}W^{180}_{106}$	σ_a(th n) 30	osc	H. Pomerance, ORNL-1164(1951); priv. comm. (1952).
$_{74}W^{182}_{108}$	σ_a(th n) 19.2	osc	H. Pomerance, ORNL-1164(1951); priv. comm. (1952).
$_{74}W^{183}_{109}$	σ_a(th n) 10.9	osc	H. Pomerance, ORNL-1164(1951); priv. comm. (1952).

$_{74}W^{184}_{110}$	σ_a(th n) 1.97 osc		H. Pomerance, ORNL-1164(1951); priv. comm. (1952).
$_{74}W^{186}_{112}$	σ_a(th n) 34.1 osc		H. Pomerance, ORNL-1164(1951); priv. comm. (1952).
$_{75}Re^{185}_{110}$	σ_a(th n) 100 osc		H. Pomerance, ORNL-1164(1951); priv. comm. (1952).
$_{75}Re^{187}_{112}$	σ_a(th n) 63 osc		H. Pomerance, ORNL-1164(1951); priv. comm. (1952).
$_{77}Ir^{192}_{115}$	τ 74.37^d		J. Kastner, Can. J. Phys. 29, 480(1951).
Pt	Relative abundances* 188, 189 <0.002% 191 <0.004% 193 <0.009% 197 <0.010% 199 <0.008% 200 <0.007%		H. E. Duckworth et al., Phys. Rev. 85, 929(1952). *Assuming Pt^{190} = 0.012%.
Au	σ_a(th n) 7.56		C. T. Hibdon, ANL-4602 (Mar. 1951).
$_{79}Au^{197}_{118}$	μ +0.136	S	F. G. Kelly, Proc. Phys. Soc. (London) A65, 250(1952).
$_{79}Au^{198}_{119}$	γ 0.411 $\alpha_K = 2.75 \times 10^{-2}$ K/L = 2.2 No ce$^-$ with E <0.328	sl;ce$^-$	O. Huber et al., Helv. Phys. Acta 25, 3 (1952).
	$\beta(0.411\gamma)$ delay $<0.4 \times 10^{-9}$s		F. K. McGowan, Phys. Rev. 85, 142(1952).
$_{79}Au^{200}_{121}$	48^m produced by Hg(γ); chem		F. D. S. Butement, Proc. Phys. Soc. (London) A64, 395 (1951).
Hg	σ_a(thermal) 26.56 σ_i(10.0 ev) 13.93 (19.5 ev) 13.3 (2700 ev) 10.4 (3000 ev) 10.7		C. T. Hibdon, ANL-4602 (Mar. 1951).
$_{80}Hg^{197}_{117}$ 65^h	τ 66.4^h γ 0.0776, 0.1914 K/L ~ 9	sr;ce$^-$ (Au)	J. M. Cork et al., Phys. Rev. 85, 386 (1952). Hg(pile n).
25^h	γ 0.1343 K/L <0.1 (Hg) 0.1654 K/L ~0.25 (Hg)	sr;ce$^-$	J. M. Cork et al., Phys. Rev. 85, 386 (1952). Hg(pile n).
$_{80}Hg^{203}_{123}$	τ 47.9^d γ 0.2795 K/L ~10	sr;ce	J. M. Cork et al., Phys. Rev. 85, 386 (1952). Hg(pile n).
	$\beta(0.28\gamma)$ delay $<0.4 \times 10^{-9}$s		F. K. McGowan, Phys. Rev. 85, 142(1952).
$_{81}Tl^{203}_{122}$	σ_a(th n) 11.0 osc		H. Pomerance, ORNL-1164(1951); priv. comm. (1952).
$_{81}Tl^{205}_{124}$	σ_a(th n) 0.77 osc		H. Pomerance, ORNL-1164(1951); priv. comm. (1952).
Pb	σ_a(th n) 0.162 osc		D. J. Littler, E. E. Lockett, priv. comm. (1952).
$_{82}Pb^{206}_{124}$	σ_a(th n) 0.026 osc		D. J. Littler, E. E. Lockett, priv. comm. (1952).
$_{82}Pb^{207}_{125}$	σ_a(th n) 0.69 osc		D. J. Littler, E. E. Lockett, priv. comm. (1952).
$_{82}Pb^{210}_{128}$	β^- 0.018 γ 0.0467 (0.0467γ)β^- $\gamma\gamma$ for E_γ = 16 – 30 kev	scin	R. C. Bannerman, S. C. Curran, Phys. Rev. 85, 134(1952).
	β^- 0.018 E_{dis} 0.065	pc	G. M. Insch et al., Phys. Rev. 85, 805 (1952).
$_{82}Pb^{212}_{130}$	Hρ(F) 1388.5 ± 0.3 Hρ(I) 1753.9 ± 0.4	sl	H. Craig, Phys. Rev. 85, 688(1952).
$_{83}Bi^{203}_{120}$	α ~4.85 α/K ~10^{-7}	pc	D. C. Dunlavey, G. T. Seaborg, Phys. Rev. 85, 757A(1952). Pb(60 Mev p); chem.
$_{83}Bi^{210}_{127}$ long	α 4.93		H. B. Levy, I. Perlman, Phys. Rev. 85, 758A (1952). Bi(n,γ); ms.
$_{83}Bi^{212}_{129}$	Hρ(A) 533.66 ± 0.12	sl	H. Craig, Phys. Rev. 85, 688(1952).
$_{84}Po^{210}_{126}$	$\alpha\gamma(\theta)$ indicates E2 γ $\alpha\gamma$ delay $<10^{-9}$s	scin	S. DeBenedetti, G. H. Minton, Phys. Rev. 85, 944(1952); 85, 726A(1952).
$_{88}Ra^{228}_{140}$	σ(th n,$\gamma\beta$)66^mAc ~36		F. Depocas, B. G. Harvey, Phys. Rev. 85, 499(1952).
$_{88}Ra^{230}_{142}$	τ 1^h β^- 1.2	sr	W. A. Jenkins, G. T. Seaborg, Phys. Rev. 85, 758A(1952). Th(180 Mev d); chem.
$_{89}Ac^{228}_{139}$	β^- ~1 1.6 1.8 2.16	sr	C. G. Campbell et al., Phil. Mag. 42, 126(1952).
$_{89}Ac^{229}_{140}$	τ 66 ± 5^m		F. Depocas, B. G. Harvey, Phys. Rev. 85, 499 (1952). Ra^{228}(n,$\gamma\beta$); chem.
	τ 67^m		W. A. Jenkins, G. T. Seaborg, Phys. Rev. 85, 758A (1952). Ra^{226}(α,p).

$_{89}Ac^{230}_{141}$	τ	$<1^m$			W. A. Jenkins, G. T. Seaborg, Phys. Rev. 85, 758A (1952). d Ra^{230}.
	β^-	2.2		sπ	
$_{92}U^{234}_{142}$	γ	$\geq 35\%$	0.055	ppl	J. Teillac, Compt. rend. 230, 1056 (1950).
$_{92}U^{238}_{146}$	γ	$\geq 24\%$	~0.050	ppl	G. Albouy, J. Teillac, Compt. rend. 234, 829(1952).
	γ	$\geq 23\%$	0.048	ppl	B. Zajac, Phil. Mag. 42, 264(1952).
	σ(th n,f)		$<5 \times 10^{-4}$		R. L. Macklin, J. H. Lykins, J. Chem. Phys. 19, 844(1951).
$_{92}U^{239}_{147}$	β^-	1.22		sl	J. R. Huizenga et al., Phys. Rev. 84, 1264 (1951). U^{238} (pile n); chem.
	γ	0.075		scin	
	2.0β and 0.9 γ not found				
$_{93}Np^{235}_{142}$	τ	410^d		pc	R. A. James et al., Phys. Rev. 85, 369 (1952). U^{235}(20 Mev d,2n).
	K $< 10\%$				
	L $> 90\%$				
$_{93}Np^{239}_{146}$	No E_β	>0.72		sl	J. R. Huizenga et al., Phys Rev. 84, 1264 (1951).
$_{95}Am^{241}_{146}$	τ	475^y			B. B. Cunningham, quoted by L. B. Asprey et al., J. Am. Chem. Soc. 73, 5715(1951).
		470^y			B. G. Harvey, Phys. Rev. 85, 482(1952).
	σ(pile n,γ)400^y Am^{242}		~50		K. Street, Jr.,et al., Phys. Rev. 85, 135 (1952).
$_{95}Am^{242}_{147}$ $\sim 16^h$	σ(pile n,f)		~2000		K. Street, Jr.,et al., Phys. Rev. 85, 135 (1952).
$\sim 400^y$	σ(pile n,γ)Am^{243}		~2000		K. Street, Jr.,et al., Phys. Rev. 85, 135 (1952).
	σ(pile n,f)		~6000		
$_{95}Am^{243}_{148}$	σ(pile n,f)		<40		K. Street, Jr.,et al., Phys. Rev. 85, 135 (1952).

Q's Between Ground States

$D(\gamma,n)H^1$	-2.231 ± 0.003	J. C. Noyes et al., Phys. Rev. 85, 727A(1952).
$H^3(d,n)He^3$	$+3.24 \pm 0.04$	H. Bichsel et al., Helv. Phys. Acta 25, 119 (1952).
$B^{10}(n,\alpha)Li^7$	$+2.78 \pm 0.02$	
$Li^6(t,d)Li^7$	$+0.982 \pm 0.007$	T. P. Pepper et al., Phys. Rev. 85, 155(1952).
$Li^6(t,p)Li^8$	$+0.784 \pm 0.015$	
$Be^9(\gamma,n)Be^8$	-1.664 ± 0.002	J. C. Noyes et al., Phys. Rev. 85, 727A(1952).

$N^{14}(n,\alpha)B^{11}$	-0.24	W. Bollmann, W. Zünti, Helv. Phys. Acta 24, 517(1951).
$C^{12}(\gamma,n)C^{11}$	-18.7	L. Katz, A. G. W. Cameron, Can. J. Phys. 29, 518(1951) and L. Katz et al., Can. J. Research 28A, 113(1950).
$O^{16}(d,\alpha)N^{14}$	$+3.09 \pm 0.02$	H. B. Burrows et al., Proc. Roy. Soc. (London) 209A, 478(1951).
$O^{16}(d,p)O^{17}$	$+1.93 \pm 0.01$	
$F^{19}(d,\alpha)O^{17}$	$+10.04 \pm 0.02$	
$O^{16}(d,n)F^{17}$	-1.51	F. A. El-Bedewi et al., Proc. Phys. Soc. (London) A64, 757 (1951).
$F^{19}(d,p)F^{20}$	$+4.39 \pm ....$	H. B. Burrows et al., Phys. Rev. 85, 155(1951).
$F^{19}(p,n)Ne^{19}$	-4.040 ± 0.004	H. B. Willard et al., Phys. Rev. 85, 849(1952).
$F^{19}(p,n)Ne^{19}$	-4.1	J. P. Blaser et al., Helv. Phys. Acta 24, 465(1951).
$Na^{23}(p,\alpha)Ne^{20}$	$+2.372 \pm 0.008$	D. M. Van Patter et al., Phys. Rev. 85, 142(1952); MIT Progress Report, Nov. 1951, 44.
$Ne^{20}(d,p)Ne^{21}$	$+4.529 \pm 0.007$	
$Ne^{22}(d,p)Ne^{23}$	$+2.964 \pm 0.007$	
$Mg^{25}(d,\alpha)Na^{23}$	$+7.019 \pm 0.013$	
$Na^{23}(p,n)Mg^{23}$	-4.97	J. P. Blaser et al., Helv. Phys. Acta 24, 465(1951).
$Al^{27}(p,\alpha)Mg^{24}$	$+1.595 \pm 0.007$	D. M. Van Patter et al., Phys. Rev. 85, 142(1952); MIT Progress Report, Nov. 1951, 44.
$Mg^{24}(d,p)Mg^{25}$	$+5.097 \pm 0.007$	
$Mg^{24}(d,p)Mg^{25}$	$+4.99 \pm 0.10$	J. Ambrosen, Nature 169, 408(1952).
$Mg^{25}(d,p)Mg^{26}$	$+8.86 \pm 0.10$	
$Mg^{25}(d,p)Mg^{26}$	$+8.880 \pm 0.012$	D. M. Van Patter et al., Phys. Rev. 85, 142(1952); MIT Progress Report, Nov. 1951, 44.
$Mg^{26}(d,p)Mg^{27}$	$+4.207 \pm 0.006$	
$Mg^{26}(d,p)Mg^{27}$	$+4.16 \pm 0.10$	J. Ambrosen, Nature 169, 408(1952).
$Mg^{24}(p,n)Al^{24}$	-14.8 ± 0.3	A. C. Birge, Phys. Rev. 85, 753A(1952).
$Mg^{25,26}(p,n)Al$	-5.1	J. P. Blaser et al., Helv. Phys. Acta 24, 465(1951).
$Si^{29}(d,\alpha)Al^{27}$	$+5.994 \pm 0.011$	D. M. Van Patter et al., Phys. Rev. 85, 142(1952); MIT Progress Report, Nov. 1951, 44.
$Al^{27}(p,n)Si^{27}$	-5.9	J. P. Blaser et al., Helv. Phys. Acta 24, 465(1951).
$P^{31}(p,\alpha)Si^{28}$	$+1.909 \pm 0.010$	D. M. Van Patter et al., Phys. Rev. 85, 142 (1952); MIT Progress Report, Nov. 1951, 44.
$P^{31}(d,\alpha)Si^{29}$	$+8.158 \pm 0.011$	
$Si^{29}(d,p)Si^{30}$	$+8.388 \pm 0.013$	
$Si^{30}(d,p)Si^{31}$	$+4.364 \pm 0.007$	
$Si^{28}(d,n)P^{29}$	$+0.29 \pm 0.04$	C. E. Mandeville et al., Phys. Rev. 85, 193(1952); 85, 725A(1952).
$Si^{29}(d,n)P^{30}$	$+3.27 \pm 0.04$	
$Si^{30}(d,n)P^{31}$	$+4.92 \pm 0.04$	
$P^{31}(d,p)P^{32}$	$+5.704 \pm 0.008$	D. M. Van Patter et al., Phys. Rev. 85, 142(1952); MIT Progress Report, Nov. 1951, 44.

$P^{32}(d,n)S^{32}$	$+6.81 \pm 0.08$	F. A. El-Bedewi et al., Nature 169, 235(1952).
$Cl^{37}(p,n)A^{37}$	-1.598 ± 0.002	W. A. Schoenfeld et al., Phys. Rev. 85, 873(1952).
$Cr^{53}(p,n)Mn^{53}$	-1.380 ± 0.008	J. A. Lovington et al., Phys. Rev. 85, 585(1952).
$Cr^{54}(p,n)Mn^{54}$	-2.163 ± 0.005	
$Mn^{55}(p,n)Fe^{55}$	-1.01	P. H. Stelson, W. M. Preston, Phys. Rev. 83, 469(1951).
$Ni^{62}(p,n)Cu^{62}$	-4.6	J. P. Blaser et al., Helv. Phys. Acta 24, 441(1951).
$Ni^{64}(p,n)Cu^{64}$	-2.5	
$Se^{78}(p,n)Br^{78}$	-4.4	
$Se^{80}(p,n)Br^{80}$	-2.6	
$Sr^{87}(p,n)Y^{87}$	-2.5	
$Y^{89}(p,n)Zr^{89}$	-3.5	
$Zr^{92}(p,n)Nb^{92}$	-2.5	
$Zr^{96}(p,n)Nb^{96}$	-2.6	
$Nb^{93}(p,n)Mo^{93}$	-3.7	
$Mo^{94}(p,n)Tc^{94}$	-5.0	
$Mo^{95}(p,n)Tc^{95}$	-3.6	
$Mo^{96}(p,n)Tc^{96}$	-3.8	
$Ru^{100}(p,n)Rh^{100}$	-4.1	
$Ru^{101}(p,n)Rh^{101}$	-2.6	J. P. Blaser et al., Helv. Phys. Acta 24, 441(1951).
$Te^{128}(p,n)I^{128}$	-3.2	
$Te^{130}(p,n)I^{130}$	-3.3	

Packing Fraction Differences, Δf, in Units 10^{-4} amu.

Doublet	Δf	Reference
$K^{39} - C_2HN$	-12.20 ± 0.02	A. Henglein, Z. Naturforsch. 6a, 745(1951).
$K^{41} - C_2H_3N$	-15.88 ± 0.01	

Atom	Mass	Reference
Na^{23}	22.99665 ±0.00008	A. Henglein, Z. Naturforsch. 6a, 745(1951). Double doublet
Pb^{208}	208.0416 ±0.0015	P. I. Richards et al., Phys. Rev. 85, 630(1952). Time of flight.
Bi^{209}	209.0466 ±0.0015	

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